

Interactive comment on “Effects of spatial variability of precipitation for process-orientated hydrological modelling: results from two nested catchments” by D. Tetzlaff and U. Uhlenbrook

D. Tetzlaff and U. Uhlenbrook

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The invaluable comments on the initial manuscript of the referee 2 are gratefully acknowledged. We have attempted to revise the manuscript accordingly. We restructured some sections, added additional information, clarified the text where necessary and changed figures as requested. We feel the paper has benefited substantially from these changes.

Specific comments:

1. The title is now modified, see response to referee 1. (“Significance of spatial variability in precipitation for process-orientated modelling: results from two nested catchments using radar and ground station data”)
2. Keywords were included in the original submitted manuscript (following the ab-

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stract). They are/were: process-oriented modelling, weather radar data calibration, rainfall variability, runoff components, prediction uncertainty, nested catchments

3. The text was clarified. The new method differs from previous methods that temporal variability in rainfall intensity is taken into account in combination with the total rainfall amount. The development of this calibration method was handled as a result, therefore the detailed description within the result section in the previous manuscript (p. 129-130). The referee suggested in point 7 a partly restructuring of the paper, what also applies to this part. The authors think the paper has definitely gained from these changes (see point 7 below).

4. The text was modified.

5. The text is now formulated more clearly.

6. Total runoff volume (not peak). The authors wanted to emphasise that just different spatial resolution in rainfall input caused these differences in simulated runoff volume.

7. Manuscript was restructured. Section headings are modified and sections are restructured following the helpful suggestions of the referee.

8. Due to the restructuring this was improved.

9. Text was modified. The used regionalization scheme for the precipitation (80:20

10. The authors wish to state that a discussion of advantages and difficulties of radar application for investigating snow processes is far beyond the scope of this paper. They did not analyse any snowfall events. As the referee commented, the aim was the investigation of summer convective events, which are characterised by their high rainfall intensities and very localised character. The authors clarified the limitations and difficulties in applying radar data throughout the text, without additional discussion of use of radar data for snow studies.

11. Due to the restructuring the text is clearer now, because the method description

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appears now in an earlier section. The whole new section 3.1.3 explains now in detail the method of radar data calibration within this study, which is also illustrated in figure 3.

12. The authors absolutely agree with the referee's comment, and we think that this becomes clear in the manuscript. However, one aim of this study was to apply operational available radar data offered by the German Weather Service. Applying the event and station dependent time shift correction and the adjustment method considering temporal variations in rainfall intensity distribution was the attempt to minimise such biases.

13. See reply to comment 7 of reviewer 1. ("In general the coefficient of correlation, r , was given as the correlation between both data sets is of interest here. The authors agree that this value of (at least) 0.69 is not very high. But still, the time shift corrections was applied and allowed an improvement in consistency between both data sets compared to "original", operational available data. Please note, that the value of r expressed the correlation BEFORE radar data calibration, but after time shift correction.")

14. See point 11. The authors clarified the method now.

15. Text was modified.

16. Discussion section was modified, references added.

17. Text was modified. The same calibration method can be applied also for less intense rain-events, because time periods when in both data sets no rain occurs (zero change in rain amount) are not considered within the calibration method. Calibration method is also already successful applied for "calibration" of gaps in ground station data time series (using neighbouring ground stations). Unfortunately, this application is not published yet, but a paper is in preparation (Tetzlaff et al.).

18. We added some text and a few references. However, as the parameter uncertainty of the used model was not investigated in this study, we feel that a broader discussion

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of this issue does not fit to the purpose of this paper.

19. Discussion section was modified, references added.

20 Text was modified.

Technical corrections:

1. This was changed now throughout the text.

2. Text was modified.

3. Text was modified.

4. Text was modified and sentences restructured.

5. Text was modified and sentences restructured.

6. Authors restructured required sentences throughout the whole manuscript.

7. Text was modified.

8. Text was modified.

9. Text was modified.

10. We tried different options to make the graph as readable as possible, but we wanted to leave it as black and white (greyscale) graph. We think that the figure with the chosen line thickness and colours of lines it is good. 11. Figure / legend was modified.

12. Figure was modified and more clearly labelled.

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